BOOK REVIEWS

Science in the British Colonies of America. *Raymond Phineas Stearns.* University of Illinois Press, Urbana, Illinois. 1970. xx+760 p., 32 figs. $20.00.

This book is important and interesting; the scholarship is expert and impeccable. The author's intent is "to provide . . . a comprehensive overview of the scientific interests and activities of American colonials . . . from about 1520 to 1770". Professor Stearns, the outstanding historian of American colonial science, is known for his monographic studies of early history of the Royal Society and especially of its early American fellows. The present book goes far beyond his modestly stated "intent". It is a fitting capstone to his long and fruitful career, which ended (November 15, 1970) just as he saw the first copies of his great volume come from the press. *Ave atque vale* to a great historian.

The author gives a view of not only the science and scientific workers of the various periods of the colonial era, but also enough of the related history of both old and new worlds to set an ample stage for his characters. Instead of plunging directly into North America, he carefully sets the European stage from which the American observations derived and took form. Since the American scientific observers did not exist and work in a vacuum, there was a wide interchange across the Atlantic. Thus the book is, in addition, a history of the science of the period 1520–1770, set in a background of political and social history.

A work which covers two and a half centuries of time and deals with scores of men could easily become a series of fragments in the manner of an encyclopedia. This the book does not become; it is expertly unified through the concept of the prevailing influence of the Royal Society of London. The Royal Society not only encouraged, but actually promoted science in the colonies. One of its founding fellows, John Winthrop, was an American. Support, direct or indirect, was provided and communications were invited, welcomed, read, and published. Before the Revolution, 53 colonial fellows had been elected and hundreds of articles from Americans published in the *Transactions of the Royal Society*. Stearns shows that, in colonial times (even as today), most scientific workers were supported in whole or in part by patrons, some of whom gave specific directions for the work they wanted done. Some of it was, in present-day parlance, "mission oriented".

In a short review, the names of all the men discussed can not be mentioned, but they are all there—from Oviedo, Monardes, Acosta, Hariot, Smith, through the Winthrops, the Mathers, Clayton, Banister, and many more. The works of John Bartram, Cadwallader Colden, and Alexander Garden are extensively treated. The section on Benjamin Franklin is likely to stand for a long time as the best brief summary (p. 619–644) of his work and his recognition by Europeans.

The references and notes are generous, but not tedious; accessory material is collected in Appendices; and the Index is expertly done. The book is pleasantly designed and printed (which cannot be said of every present-day book). This will be an important book of reference, but it is far more than that—it is interesting and at places even exciting history that can be read for pleasure, either straight through, or in the various sections, each one of which is the distillation of what must have originally been book length in itself.

GEORGE W. WHITE

A Regional Union Catalog of Manuscripts Relating to the History of Science and Technology Located in Indiana, Michigan, and Ohio. *Edwin T. Layton, Jr.*, Editor. Publication No. 1, Program in the History of Science and Technology, Case Western Reserve University, Cleveland, Ohio. (Paperback.) 1971. 215 p. Available from the editor.

This catalog is unique in that it lists archival materials owned by businesses, industries, and individuals, as well as those held by public repositories. As a result many of the collections described are "archives without archivists," in that they are not in the custody of professional archivists. The editor points out that most owners do not generally know, in detail, what they have, and it can not be assumed that these collections are permanent or are open to scholars. Many of the records listed in the catalog are probably in danger of destruction. The book was prepared, not only as a guide to the locations of collections, but also as a document to make archivists, historians, and owners of private collections more aware of the importance of archival materials and of the action necessary for their retention and maintenance.

The book contains 1,177 entries for archival materials located in Indiana, Michigan, and Ohio. By state, the entries are 533 for Michigan, 489 for Ohio, and 156 for Indiana. Within each state, the entries are subdivided by location, according to the categories: business and industry (350 entries), private collections (282), and those in repositories such as colleges, observatories, public libraries, and historical societies (545). The materials described do not pertain

solely to the history of the region covered. For each entry, the following information is given: (1) the owner, holder, or repository; (2) a brief description of the archival materials; and (3) the dates of the materials and approximate size of the collection (except for private collections). A brief description of the major products, services, and technical innovations is presented for most of the businesses and industries. For archival materials owned by individuals, the person's research specialization and most important or innovative contributions to science or technology are mentioned. The name of every person, industry, and university, and all professions, topics, and products of scientific and technological interest mentioned in the guide are reported to be listed in the 58-page index. Names of foreign companies and universities and names of chemicals are not indexed.

Any historian with an interest in the history of science or technology in Indiana, Michigan, or Ohio will find this a most needed and useful reference.

RONALD L. STUCKEY

A Glossary of Mycology. *Walter H. Snell and Esther A. Dick.* With illustrations by Henry A. C. Jackson. Harvard University Press, Cambridge, Mass. (Revised edition) 1971. xxxi+181 p. $6.50.

This is a revised edition of the standard American mycological glossary first published as *Three Thousand Mycological Terms* by the senior author in 1936, and subsequently published with this title in 1957. The revision has nearly 350 new terms plus revisions of some of the original ones.

The revision has definitions of approximately 7000 terms and, when appropriate, derivations and references to original usage. The glossary is particularly strong in descriptive terms, including those of various color codes. *Ainsworth and Bisby's Dictionary of the Fungi*, 5th ed. by G. C. Ainsworth (Commonwealth Mycological Institute, 1961) is the only comparable work in English; this *Dictionary*, however, while being strong in taxonomic categories and information, which Snell and Dick mostly lack, is weak in descriptive terms. The 15 plates, unchanged from the first edition, are useful, but only when used with the text, because there are frequently several structures illustrated with only one caption. As in the first edition, the print is difficult to read.

All libraries and serious students of fungi should have a copy of this work.

EMANUEL D. RUDOLPH

The Summer Island Site: A Study of Prehistoric Cultural Ecology and Social Organization in the Northern Lake Michigan Area. *David S. Brose.* Case Western Reserve University, Studies in Anthropology No. 1, Cleveland. 1970. xii+73 p. $2.95.

This study is an example of the "new archaeology," whose practitioners attempt to explicate the social and behavioral concomitants underlying a particular constellation of archaeological remains. As such, it shows both promise and failings.

The Summer Island site, located on the island of the same name in Lake Michigan off of the Garden Peninsula, contained four archaeological components: Middle Woodland, Oneota, Late Woodland, and Historic. This study focuses on the earliest of these, represented by four dwellings and accompanying midden dating from around A.D. 150–290. Excavations carried out during the summer of 1967 resulted in the uncovering of almost the entirety of one dwelling and portions of three others, as well as quantities of ceramics, chipped stone, faunal remains, and artifacts of stone, bone and copper. From these finds and their distribution within the site, Brose draws a number of possible conclusions concerning the economic and social organization of the ancient group living at Summer Island.

One of the greatest failings of the study is that the metric and morphological analyses of the material culture are not given, having already been published elsewhere. Though sometimes dictated by economic or other considerations, this is generally a deplorable practice. Brose does present enough descriptive data to allow the reader to follow his argument, but one is still left with a feeling of incompleteness and impatience.

Brose's analysis of the economy of the Summer Island peoples is the weakest part of his study, mostly because of a number of small errors and contradictions. For example, Table VIII seems to follow White ("Aboriginal Utilization of Food Animals," *American Antiquity*, Vol. XVIII, No. 4, 396–8, 1953) when computing the pounds of usable meat per individual of a given animal species. For example the average muskrat weighs between two and three pounds and would provide less than two pounds of edible meat, rather than the ten pounds indicated. Similarly,

the weights for rabbit, goose, and duck are much too high, while the weight for otter is too low. Surely the Summer Island people had greater access to beaver meat than Brose suggests; two beavers do not have 27 incisors between them (p. 27). Brose suggests heavy reliance on bear for food (p. 28), but only a single individual is represented at the site. He states (p. 28) that the presence of beaver bones argues for a spring occupation, yet also notes (p. 30) that winter sites in the same region show dependence on beaver. Also, it is interesting that the Summer Island people depended mostly on fish, which are not prime food species (p. 10).

Brose's reconstruction of the sociological implications of artifact distributions seems reasonable, though similar efforts at other sites are necessary to demonstrate both the validity and the inherent problems of this avenue of approach. The results can be exciting, as a comparison between Brose's effort and a more conventional archaeological monograph will illustrate.

Finally it should be noted that this is the first in a new monograph series. Additional outlets for publishing archaeological reports are always welcome, particularly when the format is as pleasant as is that of the Case Western Reserve University Studies in Anthropology.

EDWIN S. HALL

Rivulins of the Old World. *Jorgen Scheel.* T.F.H. Publications, Inc., Jersey City, N.J. 1968. 480 p., 155 color, 245 black-and-white ill. $15.00.

There are few books which attempt to cover adequately a large group of "difficult" animals and which succeed. In spite of a few irritating flaws, this is one of the few. In it Scheel has placed a mass of information on the taxonomy, distribution, aquarium and natural history, karyotypes, and speciation of the 67 valid taxa of African and Asian killifishes (and their synonyms) that aquarists know as the Panchax group. Although published by a company specializing in pet literature, *Rivulins* is not a typical aquarium book. A glance at the first 14 chapters will show that an impressive amount of general information on technical aspects of the riviulins is presented.

Of major interest is Chapter 12, *The Chromosome Conditions.* It consists of a detailed but understandable discussion of chromosome mutations, specifically fusions, and rivulin speciation. Here is presented very convincing information relating karyotype details to evolution of rivulin species and populations as shown through the occurrence of acrocentric and metacentric chromosomes, and chromosome number reduction. I have seen nothing comparable which dealt with so many species of vertebrates.

Scheel tries to present the rivulins in terms of natural populations and their variations, a treatment which at first may be confusing to someone familiar mainly with the morphological species approach. A large amount of data on aquarium and natural "strains" (genetically stable intraspecific variations) is given, but occasionally it is difficult to tell whether Scheel is discussing the characters of a species or of an aquarium-bred "strain".

A few irritating flaws detract from the book and somewhat limit its use. The taxonomic section of the book treats each taxon under the genus within which it was originally proposed. To determine the present generic assignment of a species, one must refer to an alphabetically arranged table at the front of the book. The summary tables in Appendix 2 are designed to provide a review of the morphological features of each species, but their actual value in identifying a fish is dubious because of the many taxa involved. A break-down of the tables into generic groupings would have been much more convenient. The bibliography is abbreviated, very inadequate, and quite unusable. Hopefully the publishers will devote a few more pages to this necessity in the next edition.

Despite these drawbacks, *Rivulins* presents a well-balanced and satisfactory treatment of these killifishes. The illustrations are of uniformly high quality, with emphasis on detail. Anyone with an interest in fish, whether from the aquarist's or the taxonomist's viewpoint, would find this book of interest and value.

JERRY G. WALLS

Pleistocene Stratigraphy of Northwestern Pennsylvania. *George W. White, Stanley M. Totten* and *David L. Gross.* Bulletin G 55, Pennsylvania Geological Survey, Harrisburg, Pa. 1969. 88 p. $1.00.

Previous investigations regarding the Pleistocene geology of northwestern Pennsylvania have dealt primarily with the occurrence of the deposits at the surface. However, with the advent of stripmines and road cuts for interstate highways into the area, a large number of stratigraphic sections have recently been exposed. White and his group have observed many of these exposures and have mapped in considerable detail numerous sections which elucidate a valuable subsurface extention of earlier work. The stripmine excavations have provided opportunity for

direct observation of exceptionally well-exposed till sequences in two dimensions, and also, as stripmine activity continued to cut away the entire section for considerable distances, in three dimensions, making possible more records of extensive, continuous glacial-till sections than have previously been possible.

Seven separate till units were identified in these cuts. Each of these tills is described as regards type locality, location and extent, composition, weathering character, and stratigraphic position. In addition, characteristic texture and a detailed mineralogic analysis (for feldspar, heavy minerals, and carbonate content) is included for the four most common tills: Mapledale, Titusville, Kent, and Lavery. In addition, a previously unknown and completely subsurface unit, the Slippery Rock Till, is described and is postulated to be pre-Illinoian in age.

The authors provide a concise review of the Pleistocene History in northwestern Pennsylvania as it is currently understood. The book is well written and well illustrated, and represents a valuable contribution to engineers, geologists, biologists, geographers, etc., not only for those interested in northwestern Pennsylvania, but also for those in adjacent Ohio and New York as well, because of the continuity of the drift units into these areas.

CHARLES C. KING

An Introduction to the Natural History of the Terrestrial Sphere. *Rudolf Erich Raspe.* Translated and edited by *Audrey Notvik Iverson* and *Albert V. Carozzi.* Hafner Publishing Company, New York. 1970. cxvii+381 p. $19.50.

In the preface, Raspe (1737–1794) is introduced by the editors as ". . . author of Baron Munchusen's Narrative of his Marvellous Travels and Campaign in Russia" and ". . . a romantic poet, antiquary, embezzler, spy, industrial chemist and geologist." The last item was of some relief as well as of major interest to the reviewer and should be of interest to the general reader. This hard-bound volume includes a facsimile of the original paper in Latin, a translation, Raspe's and the editor's footnotes, and an introduction giving background information about Raspe and the geological knowledge of the time. The original illustrations are carefully reproduced and a portrait of Raspe is included. The editors present an interesting and exhaustive account, filling in bibliographical, historical, and geological background. All is well indexed.

Raspe, although a part-time and somewhat unconventional student of geology, offers some rather original ideas on structural geology based on Hooke's earlier work. His thesis on the importance of earthquakes in the origin of mountains is preceded by a series of observations on rocks—their nature, occurrence, and structure—that demonstrates a critical talent in his selection of ideas and lore of his day. In contrast, in his collection of accounts of earth movements as demonstrated by the origin of the islands of the Aegean and the neighboring parts of the Mediterranean, he includes the full range of evidence from mythology to historic record. Raspe follows this list with a discussion of his modification of Hooke's hypothesis explaining the rise of continents and islands by means of earthquakes, and concludes by expressing the conviction that the Aegean would be the most favorable area for testing the soundness of his ideas.

Now some two hundred years later, a recent news account describes the studies of a geologist plotting the elevation of ancient coastal towns to establish relative movements of the islands and the sea in the Aegean. This account is accompanied by the statement that the most advanced plate-tectonic study identifies this region as one where the continent of Africa is pushing against and under eastern Europe and represents a most tectonically active region. One cannot help but wonder how much Raspe might have contributed, had he had an opportunity to concentrate his talents on geology.

This is a stimulating book, carefully and copiously documented, a valuable addition to the story of the growth of the science of geology.

CHARLES H. SUMMERSON

Charles Sprague Sargent and the Arnold Arboretum. *S. B. Sutton.* Harvard University Press, Cambridge, Massachusetts. 1970. xvii+382 p. $10.00.

Harvard University Press has performed a service to plant-investigation history by publishing Hunter Dupree's biography, *Asa Gray* (1959), and now this book. Just as Gray was the real founding scientist of Gray Herbarium at Harvard, Sargent was the dominant developer of Arnold Arboretum, which will soon celebrate its 100th anniversary.

Sargent came from a wealthy New England family. Though his education was not extraordinary, except that he was a student of Gray, his strong character, despite some qualified failures, accomplished or laid foundations for a multiplicity of admirable projects. Miss Sutton's book presents them all.

Arnold Arboretum was never a forestry or landscape-gardening school. However, through Sargent's work as Director (1873–1927), forestry, silviculture, landscape gardening, and especially

horticulture were greatly benefitted. In more recent years, various aspects of botany, dendrology, and arboriculture likewise profited from thorough studies of trees—their scientific relations, economic properties, cultural requirements, and geographic distribution throughout the world, particularly in the Orient and the Americas.

Exploratory expeditions were important. So also were publications, as witnessed by Sargent's fourteen-volume *Silva of North America*, his *Manual of Trees*, his *Report on the Forests of North America* (1880 Census), and numerous lesser works and studies, as well as his leadership in *Garden and Forest* (to 1897), *Journal of the Arnold Arboretum* (now past its 50th volume), and "Bulletin of Popular Information" (1911f) now known as *Arnoldia*. Sargent also selected and edited the *Scientific Papers of Asa Gray* (two vols.). In addition, he established the Arboretum's Herbarium (now numbering more than 909,000 specimens), and founded, largely from his own books, its Library, with a present inventory of many thousands of titles, and served as director of the Harvard Botanical Garden from 1873 to 1879.

Of nationwide importance was Sargent's work with a commission which reported (1885) on Adirondack forest conditions with recommendations for a New York State forest policy. He also chaired a National Academy of Sciences commission, whose report (1897) resulted in the proclaiming of thirteen western forest reservations.

The book has the added value of a Foreword by present Arboretum Director, Richard A. Howard. In addition, extensive materials are included on subordinate personnel, including Ernest H. Wilson, Alfred Rehder, and John G. Jack, and on collaborators, such as George Engelmann, John Muir, Joseph Rock, and many others. For anyone concerned with the early history of botany, botanists, and botanic collections, this is a very worthwhile book.

ANDREW DENNY RODGERS III

Electronics for the Physicist. *C. F. G. Delaney.* Penguin Library of Physical Sciences, Penguin Books Inc., Baltimore, Maryland. (Paperback). 1969. 265 p. $3.50.

Author Delaney has taken a giant step forward in this beginning electronics text. Instead of starting with linear networks and various theorems, the first two chapters discuss the semiconductor diode and the f.e.t. The student is drawn quickly into the action. Then Thevenin's Theorem is introduced as a model for the f.e.t. and linear networks are justified since they connect amplifier stages. A laboratory associated with this course could have f.e.t. amplifiers under way by the second week. The junction transistor, which is conceptually more difficult, is discussed in chapter 4. I'm certain that this is the correct order in which active devices should be discussed. Vacuum tubes are mentioned as an f.e.t. analogue.

The text emphasizes signals, including excellent chapters on delay lines, and pulse-forming networks, but doesn't discuss electronics in the control mode (no mention of s.c.r.'s, for instance), except for some discussion of regulated power supplies. There are no problems or examples; however, references are widely used throughout the text, and schematics and graphs appear more frequently than in the average text.

ARTHUR JARED CRANDALL

Environmental Geomorphology. *Donald R. Coates*, ed. Publications in Geomorphology, State University of New York, Binghamton, N. Y. 13901. 1971 (paperback). viii+262 p. $3.00.

This volume, consisting of 14 articles, resulted from the First Annual Geomorphology Symposium held at Binghamton, New York, on October 16 and 17, 1970. The editor defines environmental geomorphology as ". . . the practical use of geomorphology for the solution of problems where man wishes to transform landforms or to use and change surficial processes." Geomorphology is cited as the major basic discipline, along with engineering geology and economic geology, in the field of environmental geology. Some hydrogeologists and geochemists might object to the ommission of their disciplines from this list; however, at least the former need not feel slighted, since several of the papers in this volume contain much hydrogeology.

The book is divided into three parts: *Watershed Planning, Regional and Local Studies*, and *Societal and Educational Perspectives*. Two papers in the first part, *Stream Regimen and Man's Manipulation*, by Ruhe, and *Evaluating Riverscapes* by Morisawa, will be of particular interest to non-geological environmentalists as well as to geomorphologists. The second part covers beach erosion and deposition, disturbances of permafrost terrane, environmental impact of highways, and an example of some of the fine environmental studies made by the Illinois Geological Survey.

The last and shortest part of the book is devoted mainly to some of the environmental problems in whose solution geomorphologists may be able to play a leading part, including an interesting account of the legal applications of geomorphology. One paper deals with the need to promote environmental education in many departments and universities, as well as with the general public. Here and elsewhere in the book there are overtones of an inferiority complex

among geomorphologists. Geomorphology, having declined in popularity for several years, may be undergoing rejuvenation, as it is applied more and more in the fields of environmental geology and astrogeology.

The book is well edited, and contains both author and subject indexes. The diagrams and photographs are clear and in general it is an attractive paperback book. Although viewed by the editor as a suitable book for engineers, environmental managers, the general public, and students of earth science, geography, and geomorphology, I believe that it will be most useful in advanced environmental geology courses and as supplemental reading in geomorphology courses. This volume, along with subsequent volumes resulting from future Geomorphology Symposia at Binghamton, should not be absent from the geomorphologist's library.

GARY D. MCKENZIE

John Banister and His Natural History of Virginia 1678-1692. *Joseph* and *Nesta Ewan.* University of Illinois Press, Urbana. 1970. 485 p. $15.00.

This book brings together information on the life, times, associations, and contributions of John Banister. Born and educated in England, Banister, an Anglican minister, landed in Virginia in 1678 in the midst of Bacon's Rebellion. Here, he became the first university-trained naturalist to send specimens, with drawings for some, and descriptive Latin catalogues of plants, insects, spiders, and molluscs to the leading naturalists in England. His accidental death in 1692 at the age of 42 left his works unfinished and unpublished, but the results of his labors were taken up by his correspondents, contemporaries, and patrons and became incorporated into important works. As a noted example, his plant descriptions and illustrations played a vital part, both directly and indirectly, in the works of Linnaeus in the mid 1700's.

The Ewans have prepared the book in two parts. The first concerns the little-known record of Banister's life, assembled from bits of published information, his letters to contemporaries, diaries, and catalogues. From these we learn of his early life in England, education at Oxford University, trip to the New World, life in Virginia, and plants and labors accomplished for *A Natural History of Virginia.* Woven among information provided about his associates and correspondents, an engrossing picture of late-seventeenth-century England and Virginia emerges. The second part contains the faithful transcriptions of Banister's *Plant Catalogue, Insect and Arachnid Catalogue,* the lists of *Mollusca, Fossils,* and *Stones,* and the manuscript notes on the *General Natural History and Account "of the Natives."* For each work the Ewans discuss Banister's background for the study, contemporary workers and their contributions, subsequent use made of the manuscripts by later writers, and bibliographic references Banister consulted in preparing the catalogues. Banister's manuscripts, therefore, provide a picture of Virginia's early flora, fauna, and general natural history previously not available.

Other features of the book are a chronology of the Banister era from 1650 to 1753, a time chart of Banister's contemporaries and associations, a map of Virginia as Banister and his contemporaries wrote of it, a chart showing pre-Linnaean roots in North America and their European branches, seventy figures of Banister's drawings of plants and animals, and a copious list of references used by the authors. The book is a welcome addition to the literature of and about the early natural history of pioneer North America, particularly of the seventeenth and eighteenth centuries, about which so little is written compared to the nineteenth century.

RONALD L. STUCKEY

Moon Rocks and Minerals. *Alfred A. Levinson* and *S. Ross Taylor.* Pergamon Press, Inc., New York. 1971. xiv+222 p., plus 8 colored plates. $11.50.

This book is based on the extensive investigations of lunar samples collected during the *Apollo* **11** explorations and on preliminary data obtained from *Apollo* **12**, according to the subtitle. The editorial experiences of the authors have been extensive in this area, and have permitted them to extract pertinent information from a considerable volume of literature in order to summarize the similarities and differences among the rocks of the earth and of the moon. Other topics included in the nine chapters are biochemistry, age of the lunar rocks, petrology, and the origin of the moon. (Of particular interest to this reviewer was the discussion of tectites, for example.)

Since scientific precision has not been sacrificed in order to make the book attractive to the general reader, the glossary will prove helpful to persons who have not had advanced courses in science. The question is often asked: How do the rocks of the moon differ from those of the earth? Many of the answers are now available and have been presented in a comprehensible way in this book.

DUNCAN MCCONNELL

Short Classification and Description of the Various Rocks. *Abraham Gottlob Werner.* Translated by, and with an introduction and notes by *Alexander M. Ospovat.* Hafner Publishing Company, New York. 1971. x+194 p., 14 illus., 1 portrait. $13.95.

Most textbooks of geology bow briefly in the direction of the founding fathers of the science, and most of them have a special affection for Werner. Brief as the obeisance may be, many of them manage to repeat some of the inaccurate statements made about Werner since his death in 1817. For the benefit of future writers of textbooks, Professor Ospovat's translation will prove a valuable reference. For example, they will find here that Werner did not write "only one book," but that his bibliography would do credit to a professional geologist even in these days when achievement is often measured by volume alone. He would also find that Werner recognized the existence of "True Volcanic Rocks" (p. 80 in the translation) even if later (p. 84 and 86 in the translation) he categorically stated that basalt is of aqueous origin. Several other misconceptions concerning Werner and his works are corrected here. Even the *Kurze Klassifikation,* of which this book is a translation, had been given a wrong publication date (before 1777), whereas Prof. Ospovat shows conclusively that it was *written* between 1783 and 1785 and first published in 1786, thus correcting some histories of geology which give the date of publication as 1787. Details, true, but all contributing to a false picture of the great scientist and teacher that Werner undoubtedly was.

No one writing about Werner in the future can be excused for errors when this valuable book is available; thoroughly studied, this book will provide the facts about this famous early geologist. Careful scrutiny of this translation will enrich any geologist interested in the history of his science.

AURÈLE LA ROCQUE

Proceedings of the Conference on Changes in the Chemistry of Lakes Erie and Ontario. *Robert A. Sweeney,* Editor. Bulletin of the Buffalo Society of Natural Sciences. Vol. 25, No. 2. 1971. ix+85 p. $3.10 postpaid from the Buffalo Museum of Science, Humbolt Park, Buffalo, N.Y. 14211.

On 5–6 November 1970, a conference was held in Buffalo, for invited scientists from New York and Ohio, that dealt with three topics relating to chemical changes in Lakes Erie and Ontario: (1) results of previous investigations, (2) technical problems associated with such studies, and (3) areas in which additional research would be of value. The conference "proceedings" report the presentations of three speakers who are authorities on chemical changes in these lakes. Dr. Alfred M. Beeton, Center for Greak Lakes Studies, University of Wisconsin (Milwaukee), delivered the keynote address on "Chemical Characteristics of the Laurention Great Lakes." Dr. Vinod K. Chawla, Water Quality Division, Canada Centre for Inland Water (Burlington), discussed the "Changes in the Water Chemistry of Lakes Erie and Ontario." Dr. Edwin J. Skoch, Department of Biology, John Carroll University (Cleveland), spoke on the "Changes in the Sediment Chemistry of Lakes Erie and Ontario." These three papers contain numerous illustrations and pertinent references. A list of the 47 conference participants and their affiliations is also included.

Fourteen pages of the "proceedings" are devoted to open discussions following the three addresses. A particularly interesting feature is a seven-page discussion of techniques and instrumentation. As the editor points out, "such frank advice rarely is found in print."

Although much of the information contained in the addresses has been published elsewhere, the "proceedings" serves as a valuable synthesis and resumé of research dealing with chemical changes in the waters and sediments of the Lower Great Lakes. Factors reported to affect the chemical characteristics of the Lakes are enumerated: (1) geological nature of the basin, (2) chemical content of precipitation, (3) inflow of tributaries, (4) nature and intensity of man's use of the water and of the watershed, (5) major water movements, (6) thermal stratification, (7) depth of the lake, and (8) extent of biological activity. Changes in nutrients, major ions, and trace elements are discussed in detail. One of the main points of the "proceedings" is that, although much is known about the water chemistry of the Lower Great Lakes, little work has been done on the sediments as a integral part of the lake system.

CHARLES E. HERDENDORF

The Earth Sciences. *Arthur N. Strahler.* Harper and Row, New York. 2nd Edition, 1971. vii+824 p. $15.95.

This comprehensive treatment of the earth sciences deserves attention both as a college-level text and as a review for practicing geologists. As in the first edition, the text is divided into four sections: *The Earth as a Planet, The Atmosphere and Oceans, The Solid Earth,* and *The Continental Surfaces.* Changes have been made throughout, but the most extensive additions are in the last two sections. The discussions of geochemistry, mineralogy, and petrology

have been expanded greatly and should be adequate for an elementary class. Recent advances in ocean-floor studies are reflected in the discussions both of sea-floor spreading and plate tectonics, and of the classification and composition of deep-sea sediments. The composite topic of evolution and the history of life is here expanded to two chapters; reasonably detailed discussions of the history of the Grand Canyon area and of the use of paleogeographic maps strengthen the chapter on stratigraphic interpretation. The chapter on *The Geology of Planetary Space* summarizes our knowledge of lunar geology through the results of the Apollo 12 mission.

The final section is an up-to-date summary of the fields of hydrogeology and geomorphology. The final chapter, *The Pleistocene Epoch and Man*, is an attempt to tie together results of study in many disciplines of the earth sciences: stratigraphy, paleontology, oceanography, isotope studies, and astronomy.

The book lives up to its stated aims and presents a broad view of the earth sciences in a well-planned format. It would be difficult, however, to use the whole text in a one-semester course because of its length.

DAVID M. MICKELSON

Herbals, Their Origins and Evolution. A Chapter in the History of Botany 1470-1670. *Agnes Arber.* Hafner Publishing Co., Darien, Conn. 1970 (facsimile of the 1938, second edition). xxiv+326 p. $12.95.

Information about plants during the early centuries of printing was almost exclusively in herbals, or books concerned with the medicinal uses of plants. It is therefore particularly gratifying to have Mrs. Arber's work again available, as it is the most complete study in English of the herbal. Except for the two-page new preface by her daughter that incorporates brief biographical notes and a few corrections, the book reproduces by facsimile and in fine manner the 1938 edition with slightly smaller page margins.

The careful consideration of the most important printed herbals and their authors by country; the chapters on special topics such as plant description, plant classification, botanical illustration, and the doctrine of signatures; the appendices containing a chronological list of printed herbals, an extensive bibliography, and a subject index to the bibliography; as well as the adequate index all make this work a necessity for anyone interested in the history of botany. Others should enjoy this book for its sprightly style and its many well-chosen illustrations.

EMANUEL D. RUDOLPH

The Gilled Mushrooms (Agaricaceae) of Michigan and the Great Lakes Region. *C. H. Kauffman.* Dover Publications, Inc., New York, (paperback reprint of 1918 edition). 1971. xxxii+924 p. in two volumes. $9.00.

This is a republication of the original (1918) edition which has been out of print for some time (on the out-of-print market the two volumes sold for as much as 30 to 40 dollars). This was the only comprehensive, authoritative treatment of the Agaricaceae of the Great Lakes region available for many years. Many advances in mushroom taxonomy have been made in the 50 years since its publication, yet this work of Kauffman is still frequently consulted by both the professional and the amateur mycologist. For certain genera of the agarics, the treatment and keys in Kauffman are still the best that are available.

About 900 species are described, with emphasis on macroscopic characters. However, spore characteristics are also given for all species, and for some species additional microscopic features are listed. About 185 of the species are illustrated by black-and-white photographs, the printing and reproduction of which are good. Keys to the genera and species are included. Even though taxonomic and nomenclatural opinions are not the same today as in 1918, this reprint will be one that anyone seriously interested in mushrooms will want to have on hand.

C. WAYNE ELLETT

A Guide to Ohio Outdoor Education Areas. *Ruth W. Melvin.* The Ohio Department of Natural Resources and the Ohio Academy of Science, Columbus (loose-leaf paper cover), 1970. xi+143 p.

This excellently designed Guide is available to all Ohio educators, through request to the Ohio Department of Natural Resources. The use of it is urgent, for as Dr. Paul Sears points out in his Foreword, in natural communities "we have a model for the use of energy and materials which our technical civilization has violated."

The Guide is a thorough compilation of the surviving natural and partially natural rem-

nants of Ohio forests and other unusual areas that are presently accessible for outdoor education—a surprising number, actually, in our intensely populated and utilized State. Nevertheless, as outdoor education grows, the pressures on these areas could become destructive, hence the emphasis in the Guide on the necessity for obtaining permission before visiting any area, and for understanding the conditions for responsible use. A separate section describes the Nature Preserves ("essentially virgin or near virgin vegetation"), where permission is restricted to special purposes.

"How to Use the Guide" (page 1) explains its admirable organization. The characteristics of each property are then succinctly described, followed by the manager's address. Locations are given except for the Nature Preserves. Facilities and services are clearly shown on charts. There are excellent geologic and ecologic maps of Ohio, a brief bibliography, and a complete index. The Guide is enlivened by well-chosen color photos.

Much appreciation is due to the publishers of this book and to the Edwin H. and Nellie M. Rausenberger Foundation, who made this publication possible. Outstanding credit goes to Mrs. Melvin, the organizer, coordinator, and editor. She has achieved a wise blend of conservation and education concern, and a balance of geologic, biologic, and ecologic viewpoints.

KENNETH W. HUNT

Sir Charles Lyell's Scientific Journals on the Species Question. *Leonard G. Wilson*, ed. Yale University Press, New Haven and London, 1970. lxi+572 p. $17.50.

Sir Charles Lyell, the person most responsible for seeding Charles Darwin's mind with evolutionary thoughts, has seemed an enigma because of his lack of enthusiastic public support for the Darwinian explanation of evolution. Professor Wilson has done great service for those who are curious about Lyell's evolutionary thinking by publishing, in full, for the first time, Lyell's seven journals, spanning the years 1855–1861, in which the species question is considered, with explanatory notes. A penetrating introduction is also included.

Lyell's scientific honesty and curiosity are well documented, as are his basic conservatism and distrust for simple explanations. In these journals, he is constantly concerned with Man and his geological-historical origins. For example, he writes in January 1860, "To a naturalist not deeply imbued with ancestral prejudices, derivation from certain rude savages, if mankind began with a low grade of Man, might be as displeasing as to come from a Chimpanzee." (p. 346–7). Lyell terminated these journals to begin writing *The Antiquity of Man.*

The contents of his letters written to Darwin are of particular interest to students of the history of Darwinism. On September 30, 1860, he wrote to Darwin, "Instead of Selection I sh.[d] have said, Variation & Nat. Selection. My only objection is not to the term but to your assigning to it more work than it can do & not carefully guarding against confounding it with the Creative power to which 'variation' & something far higher than mere variation, viz. the capacity of ascending in the scale of being must belong." (p. 498).

Historians, biologists, and geologists will appreciate having this attractive and stimulating book.

EMANUEL D. RUDOLPH

Past and Present Causes in Geology. *Lucien Cayeux.* (Translated and edited by *Albert V. Carozzi*). Hafner Publishing Company, New York. 1971. xxiv+162 p. $13.95.

As Darwin is to evolution and Wegener to continental drift, so is Cayeux to sedimentology. The book which justifies this high prasie is *Causes anciennes et causes actuelles en géologie,* published in 1941 and not until now available in English. Dr. Carozzi has prepared not only an accurate translation, but has added comments on the ideas presented thirty years ago, most of which have been confirmed by later workers. The translator is evidently an admirer of this book and of its author, as was the late great Paul D. Krynine and other sedimentologists who read it, sometimes laboriously, in the original French. Much of the criticism levelled at this book, especially after Cayeux' death, may be due to the difficulty of understanding it ". . . because it assumes that the reader is completely familiar with the entire and enormous contribution of Cayeux which is continuously and briefly referred to." Only a professional sedimentologist familiar with both French and English couldhave written in English the clarifications which remove much of the book's difficulties. As a result of Dr. Carozzi's translation, the work will now be readily available to the English-speaking public, and verification of Cayeux' ideas will be much easier. For this brilliant commentary and clear translation, the geological profession is greatly indebted to Dr. Carozzi. As a result, historians of geology will be able to give Cayeux his true position among the pioneers of sedimentology.

AURÈLE LA ROCQUE

African Magmatism and Tectonics. *T. N. Clifford* and *I. G. Gass*, Editors. Hafner Publishing Company, New York and London (Darien, Connecticut). 1970. 461 p. $28.60.

Mantle convection and plate tectonics are hypotheses that suggest a close connection between volcanism and tectonism at mid-ocean ridges and at subduction zones along island arcs and active continental margins. Interest in these areas has diverted attention from volcanic activity in the more stable cratonic areas Africa is a prime example of a cratonic area; there are no active subduction zones adjacent to the continent except possibly the western Mediterranean, and even there the underthrusting is away from Africa. The East African Rift System, however, probably represents the early stages in the development of a mid-ocean ridge, so its study is as important to an understanding of magmatic processes related to plate tectonics as is the study of the mid-ocean ridges themselves.

The central theme to this collection of papers is the relation between magmatic activity and tectonic environment in Africa. The stage is set by a review of the major tectonothermal events which have contributed to the growth of the continent and its conversion to an old, stable, cratonic area. This growth ceased, in fact, in the early Paleozoic, after the last widespread event (dated at 550 ± 100 million years), but study of both the structural trends and isotopic dating show that much of the continent has been deformed more than once and that there is a very long history of tectonic activity. Some of the oldest rocks in the world, the Swaziland System, crop out in the Barberton region of Transvaal and are dated at about 3,400 million years; these rocks have special significance in that some of the earliest vestiges of life have been found in them, in the carbonates of the Fig Tree Series.

Perhaps the most striking aspect of the long Precambrian history, as presented in this volume, is that much of the magmatic activity is anorogenic, its location being controlled as much by pre-existing trends as by contemporaneous tectonism. This is exemplified by the association of alkali-basalt volcanism and anorogenic uplift of old crustal areas in the African Rift System, a system which stretches from the Sinai Peninsula to Mozambique. This Rift System consists of a series of huge domes whose crests have split and are the sites of extensive volcanic activity that ranges in composition from alkali basalt, through phonolites and alkali trachyte, to the rare carbonatite and nephelinite complexes. Many of the segments of the Rift System follow older trends established in the Precambrian, and similar reactivation of old structures is observed in other parts of the continent.

The most interesting variety of anorogenic activity is that of the emplacement of Kimberlite pipes. The diamond-bearing ones, which form only a tiny fraction of all Kimberlite pipes, are all confined to the older cratons, and it is suggested that diamonds survive only where the crust is rigid enough to maintain pressures at shallow depths high enough to prevent inversion to graphite.

The other major association presented here is that between tholeiitic volcanism and crustal extension. This is illustrated by the Mesozoic tholeiites of southern Africa which precede or accompany the break-up of Gondwanaland, and the late Cenozoic tholeiites of the Afar Depression and Red Sea, an area that is believed to be the site of active continental fragmentation and mid-ocean-ridge formation.

Another aspect which has considerable interest outside African geology is that the geochemistry of many igneous provinces appears to be independent of time and place, suggesting regional differences in crustal and mantle composition. This is illustrated in a regional survey of granitic rocks, pegmatites of central and southern Africa, the Great Dyke of Rhodesia, and the basaltic rocks of the Barberton region.

There is an excellent concluding review of igneous activity and its relation to mantle convection and plate tectonics, and their application to the African magmatic rocks.

This collection of papers presents a considerable body of information on various aspects of African geology, much of which is only indirectly referred to here. It will be of considerable interest to anyone concerned with African geology, as well as to those interested in more fundamental aspects of the relation between magmatic and tectonic activity.

DAVID H. ELLIOT

Erratum

On page 364 of the November, 1971, issue (v. 71 no. 6), line 4 should read: "The *normal* pigment in crayfish is a carotenoid protein complex." As stated elsewhere, blue crayfish do *not* turn red upon death.